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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

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ZOOLOGY

Female Bats Disappear To Bear and Rear Young

WHAT HAPPENS to the 200,000 bats that disappear every year in southern Indiana and northern Kentucky? John S. Hall, a University of Illinois zoologist who has studied the Indiana cave bat *Myotis sodalis* for the past three years, is still baffled by the mystery of where the females go during the summer to bear and rear their young. During the winter the bats hibernate in caves, hanging to the roof and walls in clusters of as many as 10,000. In mid-March and April the pregnant females disappear.

• Science News Letter, 78:66 July 30, 1960

MEDICINE

Appendix May Help Save Cancer Victims

THE APPENDIX, long considered an obsolete organ, may have a purpose after all. It may help save cancer victims.

Research conducted by Dr. Dieter H. Sussdorf of the California Institute of Technology indicates that the appendix may play an important role in the body's defenses against infection. This fact is particularly relevant to radiation therapy for cancer, in which high doses of total body radiation often temporarily paralyze the infection-fighting system.

Before the body recovers enough to fight back, bacteria and foreign substances called antigens may run rampant, and the victim may die—not of cancer but of infection. For this reason, paralysis of the antibody-producing mechanism is a major cause of radiation deaths.

By systematically covering with lead shields one organ and then another during radiation treatment for cancer, Dr. Sussdorf found that shielding only the appendix gave greater protection than did shielding of any other organ.

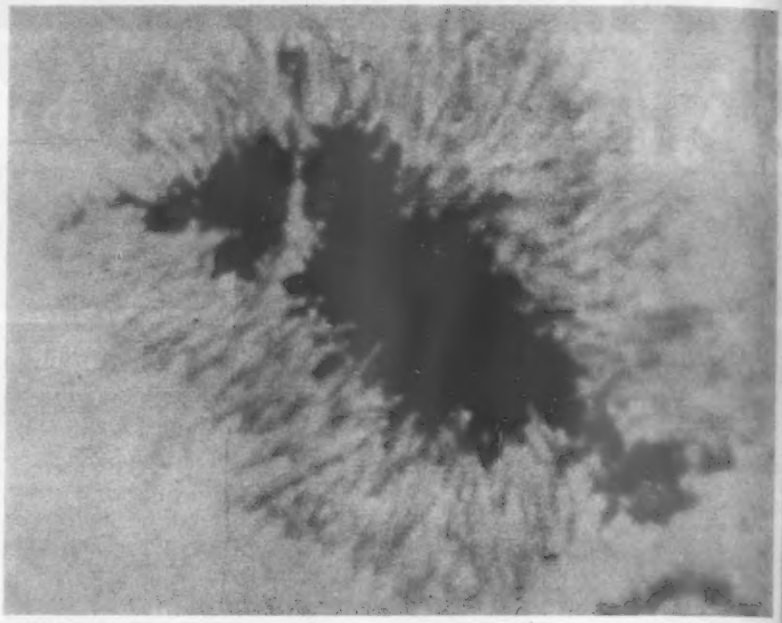
The puzzling thing was that the appendix itself is not directly involved in antibody formation. From this Dr. Sussdorf concluded that the appendix somehow had something to do with the spleen's ability to recover from radiation damage.

The spleen is a blood-storing organ rich in lymphoid tissue and is usually the first organ to react against infection by producing antibodies. After the spleen has triggered the defense mechanism, the lymphoid cells in some other organs and in the lymph glands take up the task.

From a series of radioisotope tracer studies, Dr. Sussdorf found that his reasoning was correct. Lymphoid cells in the shielded appendix migrate to the radiation-damaged spleen, repopulate that organ and manufacture antibodies there. By shielding the appendix and spleen with lead, the dangers of infection after irradiation for leukemia and certain other forms of cancer are reduced considerably.

Dr. Sussdorf began his research at the University of Chicago with Dr. Laurence R. Draper, under sponsorship of the Atomic Energy Commission.

• Science News Letter, 78:66 July 30, 1960



WHITE DOTS—The dots in the center of this sunspot are shown clearly for the first time. The photograph was taken 80,000 feet above the earth with STRATOSCOPE I, a 12-inch balloon-borne telescope.

ASTRONOMY

Dots in Sunspots

THE FIRST CLEAR PHOTOGRAPHIC EVIDENCE that sunspots, dark-appearing regions on the solar surface, contain white gaseous dots has been obtained from a balloon flown high above the earth's surface.

The photograph was taken by a Princeton University astronomy team, headed by Dr. Martin Schwarzschild, during the final balloon observations last Sept. 24. Earlier flights during last summer produced the clearest sequences of photographs ever taken of the solar surface and the areas immediately surrounding sunspots.

Because sunspots are more than a thousand degrees cooler than the sun's visible surface, or photosphere, they produce much less visible light. A different film was therefore used in the telescope-camera during the final flight to bring out the characteristics of the umbra, or main dark section.

The white dots in the sunspot are believed to be less than 200 miles in diameter, compared to the 8,000-mile diameter of the umbra in which they were found. The dots may be convection cells.

Although previous astronomical observations had suggested the existence of such dots, clear photographic evidence had never before been obtained.

The photographs were taken with STRATOSCOPE I, a 12-inch balloon-borne telescope launched from Lake Elmo, Minn., in a project jointly supported by the National Science Foundation and the Office of Naval Research.

• Science News Letter, 78:66 July 30, 1960

ELECTRONICS

Electronic Transmission

AN ELECTRONIC TRANSMISSION method that reduces telegraph and data transmission costs 60% is being tested.

Named "thin route tropo," because only a thin radio band is needed to carry signals to their destination, the new system uses tropospheric-scatter—a method of bouncing radio signals off the troposphere, several miles above the earth—as the main transmission method.

Previous scatter equipments have been thick route systems engineered for multi-voice channel capacity. This includes the world's longest one-hop scatter system, a 700-mile Air Force message carrier.

Unlike this Arctic design, which uses 120-foot antennas, the "thin route" employs an antenna only four feet wide and eight feet high, weighing less than 50 pounds. The new system on the route between Washington, D. C., and General Electric in Lynchburg, Va., also reduces power cost, as it uses only a 170-watt transmitter.

• Science News Letter, 78:66 July 30, 1960

GENERAL SCIENCE

Royal Society, 1660-1960

Founded by King Charles II, the Royal Society celebrated its tercentenary with a nine-day meeting in London attended by scientists from all over the world.

Reports by Tove Neville from London

BIOCHEMISTRY

Energy-Rich Booster Chemicals Recharge Tired Nerves, Help Them Recover

NORMAL NERVE FIBERS, which operate somewhat like the transmission system in an automobile and can run down like a tired battery, are kept going by a built-in recharger, scientists attending the tercentenary celebration of the Royal Society in London were told.

Dr. A. L. Hodgkin, research professor of the Royal Society and fellow of Trinity College at Cambridge University, said it has recently been possible to obtain evidence about the source of energy for the "ionic pump," which starts a tired nerve fiber on its way to recovery.

Most of the research has been done on the whopper-sized nerve fibers of the squid, a ten-armed relative of the octopus. In a fully grown Atlantic squid, *Loligo forbesi*, the fibers are four to eight inches long and one twenty-fifth of an inch in diameter.

For some time physicists and physiologists working on the problem of nervous transmission have known that the inside of the nerve fiber usually has a high concentration of potassium ion. Outside the thin fiber membrane is a high concentration of sodium ion.

When an electrical, or nerve, impulse comes along, some of these ions trade places through the membrane. Each exchange takes place in one millisecond, but the time required for the ions to return to their proper places after the impulse passes is relatively long. If too many impulses must be transmitted before the ions are back in their resting places, the nerve would become tired.

Without help the fiber cannot get the ions back where they belong. In poisoned or fatigued isolated squid nerve, Dr. Hodgkin said, the needed recharge comes in the form of energy-rich, phosphate chemicals—arginine phosphate and ATP, adenosine triphosphate. Either of these will bring temporary recovery to a fiber that has been poisoned, or essentially worn out, with cyanide. A large dose of arginine phosphate makes the fiber almost normal.

What happens is that the booster chemicals push the sodium ions back outside the fiber membrane and the fiber recovers. Tracer studies have shown that it takes one or two molecules of arginine phosphate to eject a single sodium ion, Dr. Hodgkin reported.

• Science News Letter, 78:67 July 30, 1960

PHYSICS

Studies of the Tracks of Cosmic Rays Will Provide Valuable Information

PREPARATIONS are now being made to capture tracks of cosmic rays with energies up to a million billion electron volts at 100,000-foot altitudes, Prof. C. F. Powell, Nobel Prize winner of the University of Bristol, told scientists at the tercentenary meeting of the Royal Society.

He said an expedition, supported by the Research Council of NATO, will send an emulsion "sandwiched" with layers of tungsten up for 40 hours' study of cosmic ray particles from a balloon in 1961. The presence of the tungsten causes the production of large numbers of electrons that appear as bundles of tracks visible to the unaided eye. The studies of the tracks give valuable information about neutral particles that could not be got by any other means.

Prof. Powell said that most elementary particles have been discovered by experiments with cosmic radiation. Later, the properties of particles and their behavior were investigated by beaming particles at a target in large atom smashers.

A second way of studying the particles is to make use of the protons and other nuclei of great energy that enter the earth's atmosphere as cosmic radiation.

The great advantage of sending detecting apparatus to high altitudes is that the particles have not been modified by passage through the atmosphere, said Prof. Powell.

For such experiments photographic emulsions are used to record the tracks of particles with great advantages. The emulsion stays sensitive and no extra apparatus is needed to make exposures. The observations allow very detailed study of individual nuclear collisions by the protons.

Several international balloon flights carrying "stacks" of emulsion to high altitudes have been undertaken, the first two from Sardinia in 1953 and 1955, Prof. Powell reported. He said many European scientists participated in these expeditions.

The latest experiment in this field was a result of international collaboration. A stack of pure emulsion was recently launched by balloon from the United States aircraft carrier, *Valley Forge*, in the Caribbean.

The balloon rose 115,000 feet and was recovered after about 14 hours flight. A second flight is being attempted in Texas, he said.

• Science News Letter, 78:67 July 30, 1960

TECHNOLOGY

Nuclear Power Necessary In Britain by 1970's

THE COST OF ELECTRICITY from the atom must be cut to help Britain meet fuel shortages expected by the early 1970's, Sir Christopher Hinton, chairman of the country's Central Electricity Generating Board, told the Royal Society at its tercentenary celebration in London.

Nuclear power will be cheaper when higher temperatures can be achieved, Sir Christopher said. Advances in technology are still bringing down the cost of conventional power. Therefore, nuclear power will have to compete with falling costs to break even and then go below cost of currently used fuels, he said.

That nuclear power is not already as cheap as conventional power is due to problems within the nuclear generators.

The development of magnesium alloys (magnox) made nuclear power generation possible, Sir Christopher said. However, further advance cannot be expected until a new material can be found. Use of stainless steel or beryllium is not promising because the cost of fuel elements would exceed that of magnox.

Sir Christopher said one engineering problem in nuclear generator design deals with the large pressure shells, made from plates of thicknesses so great that possibilities for rolling and cross-rolling of the material are minimized. There is a danger of casting defects and coarse grain in the steel for this reason.

Besides, welding of these thick plates is not easy and brittle fracture, increased by neutron irradiation, makes the problems even greater.

Past experience of reactor development has led the British Atomic Energy Authority to design the advanced graphite reactor (A.G.R.), Sir Christopher said.

It is estimated that the capital cost of the first industrial reactors of the A.G.R. type will run at about $250 per kilowatt hour.

• Science News Letter, 78:67 July 30, 1960

GENERAL SCIENCE

Faith in Science Urged Despite Dangers

DO NOT DISRUPT YOUR WORK by worry over a devastating nuclear war or over world starvation from the population explosion. Have faith in science.

This is the advice given scientists by Sir Cyril Hinshelwood in his address as president of the Royal Society at its tercentenary meeting.

(Continued on p. 79)

SCIENTIA INTERNATIONAL

NOVAS DEL MENSE IN INTERLINGUA

Recercas de Cancere.—Dece annos de recerca al Laboratorios National Brookhaven ha resultate in incoragiante successos in le tractamento de maligne tumores con (lente) neutrones thermic. Le principio del methodo es que un nube de neutrones es dirigite verso le organo tumoric ubi illos es arrestate per atomos de boron que ha previemente essite injicite in le circulation del subjecto. In iste arresto le neutrones se decompone in un particula alpha e lithium-7 (que ambes ha nulle radioactivitate), e in tanto que le decomposition occurre in un cellula maligne, isto es destruite. Le tractamento es applicate un sol vice. Illo promitte devenir importante in le caso de tumores que—a causa de lor sito—non es accessibile a altere formas de therapia. In muses con tumores experimental le methodo se ha monstrate completemente efficace. In le tractamento de humanos con tumores cerebral, illo ha resultate in un prolongation del vita del patiente. A parte le inherente problemas medico-physiologic, le nove methodologia presenta ancora formidabile difficultates technic. In le stato presente del investigationes a Brookhaven, que es persequite sub le direction de Dr. L. Farr, le tractamento de un sol patiente individual require le effortios cooperative de 150 ingenieros, technicos, medicos, e altere scientistas.

Inventiones.—Esseva patentate un nove systema de propulsion pro micre naves a motor, distincte ab le systemas traditional principalmente per le absentia de un helice. In loco de un tal, le systema ha duo tubos in forma de "L," con le bracios horizontal submergite e placiate le un in avante e le altere in retro in parallelismo con le axe del nave. Le motor pumpa aqua ex un del tubos e expelle lo per le altere. Le absentia del helice elimina le plus delicate e le plus periculose elemento del machineria in yachting a motor.

Mechanica Celeste.—Le duration del rotation del sol circum su axe es usualmente date como equal al duration de 27 dies terrestre. Sed si alora le "die" pro habitantes del sol (si tales existeva) durarea circa 648 de nostre horas, iste valor varia grandemente inter le regiones equatorial e polar. Un satisfacente explication de iste curiosissime facto ha non ancora essite trovate.

Astronomia.—Es nunc disponibile (al costo de 15 cents ab le Pressa Governamental del Statos Unite) un tabulation del numero de meteores que un bon observator pote expectar vider in le curso de un hora a non importa qual periodo del anno. Le tabulation es basate super le documentate observationes facite durante le passate 58 annos. In le curso de iste periodo de pauco plus que un medie seculo, un sufficientemente patiente e sufficientemente longeve observator haberea potite vider (in le absentia de nubes) un total de 294.000 meteores.

Obstetrica.—Pro meliorar le probabilitate del superviventia de un micre e debile neonato (super toto in le caso de geminos), Dr. M. Berlind de New York recommenda tener le infante circa 15 centimetros infra le nivello del tabula obstetric, immediatemente post su apparition e usque al momento quando le pulsation in le cordon umbilical se arresta. Le objectivo del procedimento es facer le plus grande quantitate possibile de sanguine transir ab le placenta a in le circulation del neonato.

Astronautica.—In applicar (in le futuro) pro un position como pilota de astronave, le subjecto qui ha perdite ambe gambas pote citar iste defecto de su corpore como un marcate avantage. In le locomotion intra un astronave que viagia sub le conditiones de gravitate zero, le gambas ha nulle valor, sed lor absentia reduce le peso non-productive del vehiculo. Un altere aspecto del question es le psychologia del amputato. In le terra ille vive un vita plen de obstaculos e de difficultates, e isto prepara le a acceptar inexpectate e incognite stresses con alte grados de equanimitate, e le sol cosa que le astronauta futur va poter expectar con certitude absolute es que ille va esser exponite a inexpectate stresses de omne cognite e incognite genere.

Chassar e Piscar.—In le Statos Unite, omne tertie familia include un o plure chassatores e/o piscatores. In le grande citates, omne sexte familia includes tales; in le micre citates, omne tertie; in le campania, omne secunde. In le population de subjectos de plus que 12 annos de etate, omne quinte subjecto es chassator e/o piscator. Omne quarte masculo es piscator; omne dece-prime femina es piscatrice. Omne quinte masculo es chassator; sed solmente omne cento vinti-octave femina es chassatrice. Le chassatores del Statos Unite expende omne anno un milliardo de dollars pro le requirementos de iste preoccupation. Le requirimentos del piscar es ancora plus costose. Le piscatores expende per anno duo milliardos de dollars.

Physiologia.—Limaces aquatic es difficile a anesthetisar, e quando potentissime drogas es usate, le resultante stato anesthetic non es accompaniate de relaxation muscular, de maniera que iste gastropodos non se presta facilemente a studios chirurgico-experimental. In le caso de duo species de limaces de aqua marin, *Bullia digitalis e Bullia laevissima*, Dr. A. C. Brown del Universitate Cape Town in Sud-Africa ha solvite le problema: Le reduction del salinitate del ambiente del creaturas per medio de progressive additiones de aqua distillate resulta, intra iste limaces, in un forte turgor osmotic que es accompaniate de relaxation muscular e un stato de perfecte anesthesia. Post que le salinitate del ambiente es re-normalisate, le limaces se restaura sin le minor apparente difficultate. Le caso de limaces de aqua dulce remane problematic.

Physiologia Sensori.—Calor o frigor, e alte humididate, reduce le acutessa del audita in humanos. Professor Lucia C. Morgan del Universitate Nord-Carolina ha constatate que un temperatura de 10 C e un humiditate relative de 70 pro cento representa conditiones optimal pro nostre audir.

Astro-Agricultura.—Le Corporation Republic Aviation ha popularisate, in nostre scientistas futur, le hobby de experimentos "seleno-agricole." Le corporation es interessate in observationes de crescentia vegetal sub le conditiones de basse e bassissime pression atmospheric. Illo ha offerite, in iste connexion, un manual super "jardinos lunar" a certe gruppos de studentes in le scholas secundari del Statos Unite, e usque nunc le manual ha essite demandate per 1500 subjectos. (Le interessatos includeva un adulto qui notava como su domicilio un del prisiones statal de New York.)

Pollution de Aqua.—Le industrialisation de Russia ha attingite un puncto ubi le problema del pollution del aquas public per le effluxos del grande fabricas es absolutemente le mesme como in le paises del Occidente. Jornales russe deplora le destruction del pisces in le rivieras de areas industrial, nota con alarma le resultante periculos ab le puncto de vista del sanitation social, e se plange del attitude de resignation inactive del parte del autoritates, exactemente como lo face le jornales in nostre paises del West.

• Science News Letter, 78:68 July 30, 1960

GENERAL SCIENCE

Reading Interlingua

YOU CAN READ Interlingua if you had no more than one semester of high school French or Spanish or Latin and flunked it. You can read and understand a great deal of it even if you have never had contact with any foreign language.

Send this page to an acquaintance abroad and tell him that he can get additional information about Interlingua from Alexander Gode, SCIENCE SERVICE's Interlingua Division, 80 E. 11th St., New York 3, N. Y.

Financial contributions to the Interlingua program are needed.

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ANTHROPOLOGY

Scopes Trial Recalled

Thiry-five years ago the famous Scopes trial was held in Dayton, Tenn. Watson Davis, director of *Science Service*, returned to Dayton to recall the historic battle.

A FEW of those who fought the legal and scientific battle of Dayton, Tenn., at the famous Scopes trial returned to that town July 21 after 35 years to recall the arguments of Clarence Darrow and William Jennings Bryan over the state law against teaching the evolution theory.

John T. Scopes, the convicted defendant who was supposed to have violated the state law, was one of those who returned for Scopes Trial Day proclaimed by Dr. J. J. Rodgers, mayor of Dayton.

The celebration of the anniversary was inspired by the first public presentation in the United States of the motion picture version of "Inherit the Wind," which as a stage play had a long Broadway run.

"Inherit the Wind" will stir up the evolution controversy anew, just as the original trial did, when it is shown throughout the land a few months hence. Dayton today is a Bible stronghold for old-time religion, and already there are fundamentalist radio programs on a local station. Bryan University, named for the great orator, who died just after the Scopes trial closed, is still going strong, although it is perhaps not so uncompromising as it was when founded as an aftermath of the trial.

Dr. Watson Davis covered the 1925 trial for SCIENCE SERVICE newspapers and also cooperated with Darrow and the defense attorneys in selecting and summoning scientists to Dayton. He was among the newspapermen at Dayton for the anniversary.

Many of the principals, including Bryan, Darrow, Dudley Field Malone and Arthur Garfield Hays, are dead. Some, like Scopes, who is now an oil geologist, are very much alive.

The controversy is feebler, perhaps, but not dead. The law is a dead letter, but still on the statute books is the provision that it is unlawful "to teach any theory that denies the story of Divine Creation of man as taught in the Bible, or to teach instead that man has descended from a lower order of animals."

There is a petition circulating to repeal this law.

• Science News Letter, 78:69 July 30, 1960

ANTHROPOLOGY

Testimony for Evolution

"THE VERY HILLS themselves testify for evolution," Dr. Watson Davis wrote when, 35 years ago, he covered the famous trial of John T. Scopes for violation of the Tennessee anti-evolution law. The hills of Dayton, Tenn., still present their evidence for those who will but read the record of the rocks.

The following SCIENCE SERVICE dispatch needs no correction for filing from the Scopes Trial Day celebration:

The little town of Dayton could not be better placed geologically as the site for such a test to determine whether natural law, made by God, or legal law, made by man, shall prevail.

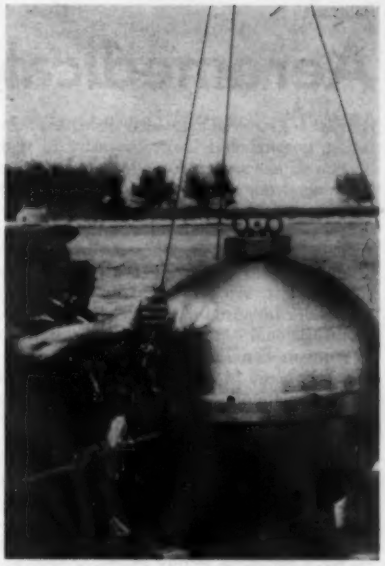
The very ground the courthouse is placed upon, the rocks of the landscape with the embalmed life of ages ago, will all be irrefutable witnesses for the defense if men will but use their eyes and their brains.

West of the little country town of Dayton is Walden's Ridge—named for an event in a previous struggle that concerned the freedom of the body of man. It is appropriate that this ridge is composed of the youngest and most recent rocks of the region thereabout and that below it, exposed by the wear and wash and the uneasiness of the earth for millenniums, there is layer upon layer of rocks, each representing different and progressively older deposits. The ridge itself is composed of sandstone interleaved with layers of coal, the natural source of one of the commercial products of Dayton. This is the record of the rocks that testifies today that there was a time when trees looked like gigantic ferns and had spores instead of seeds. Look at a piece of coal under the microscope and those spores can be seen and identified today.

Close by the coal seams are layers of iron ore made by the accumulative activities of millions of bacteria millions of years ago. And lower down in the hills and earlier in age are strata of limestone, useful to man in utilizing the iron. These many layers of rocks were made by nature in the geological era now called by scientists the Carboniferous on account of its coal. Below them there are Devonian and Silurian rocks and earth upon which the town of Dayton itself rests and out of which spring strawberries and peaches, the principal products of the region.

In all of these rock layers evidence of prehistoric life can be found. There are spores of the trees that made the coal, calcified remains of trilobites, ancestors of the modern cockroach, fossil tree trunks, and other animal and vegetable remains of a time that antedated man by millions of years.

• Science News Letter, 78:69 July 30, 1960



DEEP DIP—This unmanned sphere, developed by the U. S. Naval Ordnance Laboratory at White Oak, Silver Spring, Md., will carry research devices deep into the ocean.

MEDICINE

Congenital Heart Defect Diagnosed Before Birth

HEART BLOCK in three unborn babies has been diagnosed with an electrocardiograph.

Drs. Saul D. Larks, University of California, Los Angeles, and Lawrence Longo of the Los Angeles County General Hospital report in the Journal of the American Medical Association, 173:1217, 1960, that this unique use of the electrocardiograph may permit surgeons to prepare for corrective surgery immediately after delivery.

They say the technique may help uncover the cause of such inborn defects. Recent improvements in the use of the electrocardiograph permit physicians to make accurate charts of the current produced by the contraction of an infant's heart muscle as early as the 22nd week of pregnancy.

• Science News Letter, 78:69 July 30, 1960

ASTRONOMY

Sun Rotates Faster at Equator Than at Poles

IF THE EARTH rotated in the same way as the sun, the day would be shorter at our equator and people would have more birthdays there. This was reported to observers of auroras, or northern lights, by Prof. C. W. Gartlein of Cornell University's IGY Auroral Data Center, Ithaca, N. Y., to illustrate the fact that the sun's rotation is odd, being faster nearer the equator than at the poles. The solar rotation period is usually assumed to be 27 days, but the reason for its variation from equator to pole is not known.

• Science News Letter, 78:69 July 30, 1960

MEDICINE

Aeromedical Research

REVOLUTIONARY IMPROVEMENTS in future hospital and home patient care will be one of the many down-to-earth benefits resulting from aerospace medical research by the Air Force.

Instruments designed for recording environmental factors in space can be adapted for better patient care and study, Maj. Gen. O. K. Niess, Air Force Surgeon General, told the 24th Annual Educational Conference National Association of Sanitarians meeting in San Francisco.

In the future "patients could be electronically monitored, so to speak, with miniaturized instruments and be watched from a central recording station," he said.

Electrodes could be painlessly implanted on the patient to record all physiological processes. These would then be centrally recorded and reduced mechanically by special medical computers, thus providing the doctor a complete picture of the patient for diagnosis, study and treatment.

The ability to effect such constant and detailed observation would permit more home care for patients ordinarily requiring hospitalization. This in turn would relieve the need for more hospital beds, a major factor in the failure to provide adequate medical care for the very sick.

Studies of physical and psychological stresses in space have yielded new and important knowledge and understanding of the factors affecting human behavior, which should enable man to better face the stresses and strains of daily living on earth.

Gen. Niess reported that physiological studies on centrifuges and rocket-powered sleds "have been of great value in the analysis of mechanical injuries and protection in traffic accidents here on the earth's surface."

Public health problems concerned with fuels, oxidizers and other toxic materials used in space research, as well as safety practices and noise hazards associated with space vehicle operation, are also under investigation by the Air Force.

Noting the high cost of establishing space travel, the Air Force Surgeon General predicted that the rewards in research, advancement in medicine and public health will be "amazing" and will enable man to "influence the development of new methods and instrumentation in these fields."

• Science News Letter, 78:70 July 30, 1960

GENERAL SCIENCE

Space Program Results

BILLIONS OF DOLLARS already have been poured into space research and burned up in rocket launches, and in the next decade the United States will spend another 30 to 50 billion dollars on its space program.

The financial investment is staggering; but, happily, so are the benefits already received as well as the promise of future dividends.

Our efforts in space have greatly advanced medical research. Hydrazine, a liquid missile propellant, has proved useful in treating certain mental illnesses and tuberculosis. Space-designed electronic equipment is being adapted to measure body temperature and blood flow. Film resistance thermometers, highly useful in medical research, are another development from the space program.

The unexpected and important breakthrough from the one discovery of the medical value of hydrazine alone cannot be calculated in dollars and cents.

Pyroceram, developed for missile radomes (housing for radar antennas), has made possible better and more attractive pots and pans for the modern kitchen. Satellite scan devices are being used in such domestic infrared appliances as lamps, roasters and ovens. Better portable radio and television sets are available now because of miniature electronics and bearings used in and designed originally for satellites.

There are new materials, fabrics, alloys and compounds that are being adapted for consumer commercial markets.

Silicones used for motor insulation and subzero lubricants required for space are being used in new glass-making techniques for countless products for both home and industry.

Engines, automatic pilots, radar systems and flight equipment, developed for space, already have been used to improve conventional aircraft.

Missiles have been used to help build the St. Lawrence Seaway and are bringing down the high costs of quarrying, thus making economically available new sources of ore and hydrocarbons.

In the future, mail may become almost as swift as telephone when guidance devices, now being developed, make possible soft landings necessary for commercial rocket cargo and passenger transport.

A new welding process using a high-powered electron beam will mean stronger and more fire-resistant buildings and homes in the future at more economical cost.

Space research has provided new tools for food and agriculture. Infrared blanching is a new and effective technique in preparing foods for canning and freezing. A new forage harvester based on principles of aerodynamics developed by missile engineers is a space-age contribution to the age-old profession of farming.

The development of new foods for growth in the confines of a space cabin may prove to be a valuable food source as the world population climbs and our conventional food sources decline.

Weather modification is another promise of the space age further in the future. But better understanding of weather processes soon may make accurate, long-range weather prediction possible, which would mean millions of dollars saved by being able to know when to plant crops as well as being able to avoid crop damage.

The Army's work on an anti-radiation drug not only would be invaluable in civil defense in the event of atomic war, but would be a great protection for atomic workers in peaceful pursuits.

The axiom that you have to spend money to make money is amply demonstrated in the space program, which has opened vast new industries, thus increasing the demand for workers, specialists, scientists and technicians to an all-time high, and increasing employment and national income.

These are some of the valuable rewards reaped from efforts in space, as reported by the House Committee on Science and Astronautics in The Practical Values of Space Explorations. But probably the greatest benefit may come in that, as nations strive to conquer space, the high cost of space exploration may force nations attempting to conquer that area to give up conquering each other.

• Science News Letter, 78:70 July 30, 1960

SEISMOLOGY

Undersea Seismograph To Record Shock Waves

A ROCKET-SHAPED DEVICE is being dropped to the ocean floor about 150 miles west of Bermuda, to fish for profiles of the ocean bottom.

The device is a new underwater seismograph for recording shock waves. It was built at Columbia University's Lamont Geological Observatory in Palisades, N. Y.

It may tell scientists new things about underwater sound transmission and may indicate a fairly good sound channel or wave guide in the upper part of the ocean-bottom sediment. These sound studies could have application in military communications and submarine detection systems.

John Ewing, the Lamont geophysicist who is directing the six-week test of the new device, believes the device will be "as valuable to us as a telescope on a high mountain is to an astronomer."

The new 14-foot device has a nose cone with a spike on one end and tail fins on the other. The scientists are dropping the device nose first into sediment 18,000 feet below the ocean's surface. It will stand upright on its spike.

Columbia's converted mine sweeper, *Sir Horace Lamb*, will drop depth charges and the seismograph will record the shocks.

As the seismograph responds to motions of the earth, its signals will be amplified and transmitted through the water acoustically to Columbia's schooner *Grace*.

The seismograph may also be useful in recording natural earthquakes that often occur under the ocean, and in studying ocean-bottom sediment.

The transistorized device has batteries that will keep it functioning for four and a half to five days.

• Science News Letter, 78:70 July 30, 1960

DRIVER'S DELIGHT—Designed by Dr. Laurence E. Morehouse and his associates at the University of California, Los Angeles, this fatigue-reducing seat cushion is tested by a subject.

TECHNOLOGY

Truck Driver's Cushion Reduces Driving Fatigue

A SELF-ALIGNING seat cushion that reduces foot swelling, leg numbness and other causes of truck driver fatigue has been developed.

It was designed by Dr. Laurence E. Morehouse and his associates in the Human Performance Laboratory of the University of California, Los Angeles, and tested by five drivers of the North American Van Lines on cross-country trips.

Dr. Morehouse, who supervised the truck drivers' testing, said the seat cushion embodies a new and revolutionary concept of seating.

It supports the body's weight on the ischial tuberosities (seat bones) instead of the fleshy, vein-lined thighs, and employs a system of soft springs which, due to the driver's continual change of position, are in constant though barely noticeable motion.

This maintains the massaging or "pumping" actions of muscular movements even though the driver is seated.

"Studies indicate that stoppage of normal circulation and hydrostatic blood pooling from thigh pressure during long periods of driving may be responsible for many driving accidents because of slowed reactions and blackouts," Dr. Morehouse said.

The self-aligning seat cushion, now being produced commercially, is applicable to present truck chassis or frames without disturbing shock absorbent units or seat backs already in use, he noted.

Dr. Morehouse, a professor of physical education and a noted physiologist, specializes in fatigue factors as related to human performance. His research led to the development of the Ripple Sole for shoes.

• Science News Letter, 78:71 July 30, 1960

MEDICINE

Atomic Tool for Cancer

AN ATOMIC TOOL, the thermal (slow) neutron, is bringing man closer to victory in his fight against cancer.

Neutrons are electrically neutral, high or fast-energy particles that trigger atomic reactors and bombs. Thermal neutrons are developed by passing fast neutrons of 6,000,000 electron volts each through a moderator or nuclear reactor which slows them by cutting down their voltage to .025 electron volts.

Thermal or slow neutrons produced in the special medical reactor at Brookhaven National Laboratory at Upton, L. I., N .Y., are providing a wholly successful therapy in treating experimental tumors in mice.

The therapy also has been significantly effective in treating glioblastoma multiformi, a fatal human brain cancer that has proved unresponsive to X-ray, surgery or other cancer therapy.

Its effectiveness in mice and men gives hope of future success in treating localized, deep-seated cancers that cannot be surgically removed or otherwise treated, Dr. Lee Farr, medical director at the Brookhaven Laboratory and a specialist in nuclear medicine, said in an interview.

Brookhaven's use of slow neutrons in treating cancer is the result of more than ten years of experimental and clinical research under Dr. Farr's direction.

Previous research by others had revealed that thermal neutrons can be captured by atoms such as uranium, lithium and boron. Normally, the total distance traveled by the free thermal neutron is approximately the diameter of a living cell. Its capture both shortens its path and disintegrates the neutron into two heavy particles, alpha and lithium-7, neither of which is radioactive or harmful. This known behavior makes it possible to control the reaction and limit it.

A patient first receives an injection of boron into his blood stream. After half an hour, a cloud of the slowed-down neutrons is passed on to the area treated for a matter of minutes, less than ten. Trapped by the boron, the neutrons pass only halfway through the diseased cells and destroy them.

"They do not appear in any way adversely to affect healthy tissue or blood," Dr. Farr said. "It is a one-shot treatment and for complete effectiveness, the thermal neutrons must penetrate every cell of the diseased area in sufficient numbers and within the specified time."

The small size of mice permits an easy solution to this problem of "penetration in depth and time," as Dr. Farr describes it. By means of thermal neutron therapy, cancers in mice are destroyed at will at Brookhaven without any recurrence of the disease in the normal two- to three-year life span.

The size of man presents a different engineering problem, which has proved more difficult to solve. Thirty-five cancer sufferers with advanced stages of severe malignant brain tumors unresponsive to other treatment were referred to Brookhaven by their physicians for thermal neutron treatment. Most of these were stretcher patients who after the one-shot treatment were able to walk out of the Laboraory and resume normal activities. However, in time, all the human patients succumbed to the tumor, which examination showed had not been completely penetrated by the neutrons in numbers sufficient to destroy all diseased tissue.

This difficult-to-treat human brain cancer was selected for treatment by Dr. Farr and his staff because "it is common enough to afford selective material; the short life expectancy of its victims allow us to know within a year the results of our efforts; and no other treatment is known to be effective.

"While we are far from achieving the success in treating men that we have demonstrated in treating mice, we have been able to provide patients with a substantial period in which he may be both comfortable, active and productive."

Dr. Farr believes the solution is attainable and may require a better designed reactor as well as more research on the physiology of the reaction in the therapy. Currently a medical reactor that meets Dr. Farr's specifications is under design and is expected to be constructed in the next five years.

Meanwhile, the dramatic although limited success in treating and temporarily arresting the deteriorating human brain cancers has encouraged Dr. Farr and his staff to use the thermal neutron therapy in other varieties of cancer suffered by man. Because there is no observable radiation damage from this therapy, it may be used on patients who have not responded with complete success to X-ray therapy.

Cancer patients treated at Brookhaven are referral patients only. It is too early to estimate accurately the effectiveness of the therapy on recently treated patients.

It takes a "team effort" of 150 persons—engineers, technicians and scientists—to give a thermal neutron treatment to a single patient.

• Science News Letter, 78:71 July 30, 1960

ROCKETS AND MISSILES

Canaveral System To Monitor Missiles

A MISSILE TRAJECTORY measurement system designed to monitor the guidance performance of missiles launched at the Atlantic Missile Range will be developed by the General Electric Company under a $15,500,000 contract with the Air Force. Preliminary planning for the system is now underway for the basic system expected to be completed by 1962. Later on, a more accurate system is planned for operation that will keep the basic system as an integral part. The basic system will be installed near the Air Force Missile Test Center in Cape Canaveral.

• Science News Letter, 78:71 July 30, 1960

AERONAUTICS

Astronauts Have Illusions In Adapting to Spin

AFTER INITIAL ILLUSIONS and nausea, astronauts probably can adapt to the spinning of a satellite, an experiment by the medical officer in charge of the Able-Baker monkey flight has demonstrated.

The medical officer, Dr. Ashton Graybiel, director of the U. S. Naval School of Aviation Medicine in Pensacola, Fla., put volunteers to this test:

Four at a time they were locked into a circular room that rotated the men at a constant speed for two days. In the slowest rotation of the six separate tests, the room went around 1.71 times a minute. In the speediest test, the room rotated 10 times a minute.

An official of the National Aeronautics and Space Administration said large satellites for men might be rotated at similar speeds as they are launched and travel toward orbit. Satellites might also be rotated in orbit so that centrifugal force would tend to offset the expected feeling of weightlessness in orbit.

In the rotation tests, one of six volunteers lost the function of sensory organs of his inner ears. But this same subject was the only one that did not develop other unpleasant symptoms such as apathy, illusions and nausea. These symptoms sometimes prevented the subjects from performing simulated space tasks. But the troubles rapidly disappeared—only to reappear to a more moderate extent when rotation ended.

Drs. Graybiel, Brant Clark and J. J. Zarriello report in the Archives of Neurology, 3:55, 1960, that the rotating room method promises to help reveal the causes of motion sickness and point to its control.

The rotating room moved around at speeds similar to those of manned radar platforms and could be useful in the selection, indoctrination and preconditioning of both radar personnel and astronauts.

• Science News Letter, 78:72 July 30, 1960

BIOLOGY

Largest Scallop Bed Is Near Cape Canaveral

THE LARGEST SCALLOP BED known in the world has been discovered along the east coast of Florida near Cape Canaveral. It contains millions of calico scallops, an edible variety not presently available on the world market.

The discovery was made during routine exploration from the *Silver Bay*, a research vessel operated by the U. S. Fish and Wildlife Service. Calico scallops inhabit coastal waters from North Carolina to South America, but the place where these creatures thrive best is at depths of 60 to 192 feet between Daytona Beach and Fort Pierce—an area of 1,200 square miles.

Scallops are a bivalve mollusk of the same class as oysters, clams and mussels. The main edible varieties are the deep-sea scallops of New England and the bay scallops of the middle Atlantic coast.

The calico scallop, *Pecten gibbus*, is a little fellow, about two and one-half inches in diameter. Its shell is ribbed and colorfully decorated. Like all other scallops, it swims in a jumping fashion by opening and powerfully closing its shell valves, thus forcing out a jet of contained water. This jet propulsion has prompted Florida fishermen to refer to their new find as "guided mussels."

The muscle that closes the shell and forces out the water jet is the edible part of the scallop, about the size of a man's thumb in the calico variety. At present this muscle must be separated from the viscera by hand. Methods of mechanical separation are being investigated and, if this problem can be solved, the calico scallop beds may turn into a million-dollar food industry.

• Science News Letter, 78:72 July 30, 1960

PHYSICS

World's Most Powerful Magnet at Laboratory

A NATIONAL RESEARCH FACILITY containing the world's most powerful magnet will be built at Cambridge, Mass., for study of the fundamental properties of matter near absolute zero, which is 459.7 degrees below zero Fahrenheit.

The Massachusetts Institute of Technology will operate the facility under a multi-million dollar contract with the Air Research and Development Command of the Air Force. The Air Force announced the project as a step to fill a void in the facilities available to the scientific world for extremely high, continuous magnetic fields.

The laboratory is expected to be completed in 1964. An initial investment of $5,600,000 for construction and management of the program will be made during the Federal fiscal year 1961.

• Science News Letter, 78:72 July 30, 1960

ASTRONOMY

"Most Remarkable" Chain of Galaxies

A CHAIN OF FIVE GALAXIES, one of the "most remarkable objects" in the sky, has now been photographed with the 82-inch telescope at the W. J. McDonald Observatory in Texas.

The five galaxies are believed to be physically connected. If they are arranged as a chain in space, it is unlikely that this configuration is stable.

It is also unlikely that the chain is due to chance, Drs. E. M. and G. R. Burbidge report in the Astrophysical Journal, 131:598, 1960. The husband and wife astronomical team work at the University of Chicago's Yerkes Observatory, Williams Bay, Wis., and McDonald, operated jointly by the Universities of Chicago and Texas.

Quintets of galaxies are very rare. The Drs. Burbidge suggest that this system represents some transient stage in the formation or evolution of small groups of galaxies. Galaxies are groupings of billions of stars, and there are countless billions of galaxies in the universe.

• Science News Letter, 78:72 July 30, 1960

IN SCIENCE

ARCHAEOLOGY

Ancient Treasure Ship To Be Salvaged

WHEN WORKMEN SALVAGE a cargo of bronze implements and ox-hide-shaped copper ingots from a ship sunk 1,450 years before the birth of Christ, they will be taking part in what is reported to be the first scientifically organized exploration of an ancient wreck. The ship was evidently on its way from the mines of Cyprus. The ingots, some bearing stamped impressions, served as the currency of that time. The wreck was found along with 46 other ancient wrecks off the southwestern coast of Turkey.

Taking part in the exploration is George Bass of the Mediterranean section of the University Museum, Philadelphia. Expert divers, photographers and underwater draftsmen will also participate in the exploration, reported in Expedition, 2:21, 1960.

• Science News Letter, 78:72 July 30, 1960

MEDICINE

Old Surgical Technique Used for Lung Disease

LIVES OF PERSONS with chronic lung disease today are being saved by an ancient surgical technique that dates from the dawn of modern medicine.

Drs. L. B. Tecimer and Morton Lee Pearce and Joe Yamashita of the University of California School of Medicine, Los Angeles, and Veterans Administration Center describe the use of an artificial opening in the windpipe (tracheotomy) in treatment of acute pulmonary insufficiency in chronic lung disease. Their findings are reported in the American Medical Association's Archives of Internal Medicine, 105:891, 1960.

The first tracheotomy is thought to have been performed in about 124 B.C. by the Greeks, the physicians said. Since that time the procedure has been used primarily in cases of obstruction of the windpipe (trachea).

The Los Angeles physicians have found the procedure useful in treating an increasing number of acute pulmonary insufficiency complications of the chronic lung disease, emphysema.

The artificial opening is especially useful in aspiration of material the patient is unable to cough up. If the patient's difficulty is severe enough to warrant use of an iron lung, the tracheotomy is mandatory, they reported.

The surgical procedure to make the opening is a minor one. Healing of the opening is rapid once the opening is no longer needed, and the minor scar that occurs presents no problem.

• Science News Letter, 78:72 July 30, 1960

NE FIELDS

NAVIGATION

Radar Helps Bridge Operators Spot Ships

RADAR has been installed on the Aerial Lift Bridge in Duluth, Minn., to help bridge operators spot ships approaching the drawbridge in the fog. Threading iron ore boats, longer than two football fields, through the canal into the twin ports of Duluth and Superior requires expert seamanship. The radar will enable bridge tenders to anticipate openings, which average 30 daily, by spotting approaching vessels as far as 32 miles away.

• Science News Letter, 78:73 July 30, 1960

ROCKETS AND MISSILES

Rockets to Study Danger to Spacemen

A BASKETBALL-SIZED ROCKET PROBE this year will help determine how dangerous the earth's radiation belts will be to astronauts.

A four-stage, solid-fuel Argo D-8 research rocket will be used to hurl the vehicle to heights as great as 10,000 miles. The payload is called NERV, for Nuclear Emulsion Recovery Vehicle. It will be cone-shaped and weigh 75 pounds.

Developed by the General Electric Company for the National Aeronautics and Space Administration, it will contain a disc made of strips of sensitive material called nuclear emulsion. An electro-mechanical shutter will protect the material until time for exposure.

After its trip up, the unit will re-enter the atmosphere and drop somewhere in the Pacific Ocean range. It will float, stain the water with dye and broadcast an electronic signal to aid in recovery.

• Science News Letter, 78:73 July 30, 1960

PUBLIC HEALTH

Bird Radiation Study May Help Man

RADIATION STUDIES strictly for the birds at Oak Ridge National Laboratory may provide important information on the amount of radiation man may expect to accumulate from his diet.

The seed-fruit-insect diet of birds is sufficiently similar to the grain-fruit-meat diet of man to provide a basis for estimating radiation levels in man, William K. Willard of the University of Georgia reports in Science, 132:148, 1960.

The levels of concentration of such harmful beta-emitting radioactive elements as strontium-90 and cesium-137, in the bones and muscles of birds feeding at the Oak Ridge White Oak Lake basin, an atomic waste disposal area, showed a "striking" difference in levels according to both season and feeding zones.

Birds, such as the song and field sparrow and the water thrush, which feed close to the ground, had the highest tissue levels of radiation. Those, like the goldfinch and indigo bunting, which feed between the tall and the low vegetation, had only about a tenth as high gross beta activity.

Thicket birds, the cardinal and catbird, had one-twentieth the radioactivity, while the radiation in the humming-bird, which fed from the lake bed infrequently, was scarcely above background.

The total body burden of radiation in the birds that had fed through the winter was markedly higher than the summer-feeding birds. The seasonal changes may be explained by the fact that in the summer the bird population feeds largely on insects. In the winter they feed on seeds, for which they must probe in the more heavily contaminated soil.

The levels of the radiation in birds, both average and maximum, were found to be higher "than we would want to risk in man," Mr. Willard says. "At present, it is not known whether these are actually harmful to the birds." No estimates from bird to man on radiation levels have been completed.

• Science News Letter, 78:73 July 30, 1960

GEOPHYSICS

Fallout Found Lower In Southern Hemisphere

RADIOACTIVE fallout from nuclear test explosions is "considerably lower" in the Southern than in the Northern Hemisphere, four Naval Research Laboratory scientists confirmed.

They say studies of the debris thrown into the atmosphere when nuclear bombs are exploded also showed that air in the stratosphere mixes only slowly across the equator. They compared the amounts of radioactive tungsten-185 and strontium-90 in the air at various times after the 1958 nuclear tests in the Pacific.

The usefulness of tungsten-185 as a tracer of fallout from the Hardtack test series is rapidly nearing an end because most of the element's radioactivity has disappeared. The report on radioactive contamination of the atmosphere in Science, 132:154, 1960, is made by Drs. L. B. Lockhart Jr., R. L. Patterson Jr., A. W. Saunders Jr. and R. W. Black.

• Science News Letter, 78:73 July 30, 1960

MEDICINE

Toilet Soap Safe For Eczema Patients

ECZEMA PATIENTS may use ordinary toilet soap without fear of making their skin disease worse, five Cleveland physicians report after a one-year study of 250 patients with four different kinds of skin rashes. Drs. Richard B. Stoughton, Lew W. Potts, William Clendenning, Stuart Fisher and Morton Kress, University Hospitals, collaborated on the report, which appears in the Journal of the American Medical Association, 173:1196, 1960.

• Science News Letter, 78:73 July 30, 1960

MEDICINE

Navy Warns Skin Divers Against Deadly Device

THE MOMSEN LUNG—a device which saved many sailors—may mean death for skin divers and swimmers, the Navy has warned. Used by the Navy in escape from submarines until 1956, the device definitely was not designed for diving, the Navy said.

Use of the lung in swimming, and especially as a breathing apparatus for skin diving, can cause death from lack of oxygen, rupture of the lungs, carbon dioxide poisoning or drowning. Some of the devices have been sold through surplus outlets. Navy officials urge that all of them be destroyed or turned over to the Navy.

• Science News Letter, 78:73 July 30, 1960

PYSCHOLOGY

Engineers Produce More When Specially Treated

STAFF SCIENTISTS and engineers are most productive when they are recognized and treated as highly skilled individuals. This is the conclusion of the bureau of industrial relations of the University of Michigan, which interviewed 90 supervisors and 277 scientific and engineering staff members of ten selected companies.

The bureau summarized the striking differences between professional workers and other groups of employees as:

1. Scientists and engineers are more responsible, objective and involved in their work.

2.They want greater individual freedom and less routine supervision.

3. They show a greater need for tangible and intangible rewards for their work and ideas.

4. They are more ambitious, creative, analytical, introverted and emotional.

5. They have broader, higher and more definite goals.

Professional staff members studied found greatest satisfaction in their jobs when their work was varied, included a balance of laboratory and technical work and permitted personal responsibility for the entire project. They liked new and challenging assignments, utilization and extension of their abilities and opportunities for growth and advancement.

They disliked drafting, clerical and routine tasks, report writing, certain aspects of basic and applied research and other "non-engineering" or "non-scientific" work.

The most serious problems of young professionals were insufficient technical preparation in school, inadequate psychological preparation for work in industry and difficult adjustment from academic to industrial standards, systems and pace.

Complete details of this study are included in a book recently published in Ann Arbor by the University of Michigan, "Characteristics of Engineers and Scientists," by Lee E. Danielson, professor of industrial relations at the University.

• Science News Letter, 78:73 July 30, 1960

ARCHAEOLOGY

Past Threatened by Aswan Dam

Eight countries have responded to UNESCO's plea for aid in saving hundreds of ancient Egyptian monuments to be flooded when the new high Aswan Dam is built.

By TOVE NEVILLE

THE ANCIENT GODS OF EGYPT are threatened with extinction by flood waters from the reservoir of the new high Aswan Dam being built and supervised by Russia.

The high dam will promote the cultivation of 2,500,000 acres of desert to help feed the rapidly growing population. But in providing for the future, the water of the dam will destroy some of the greatest monuments of man's heritage.

It is up to the rest of the world to rescue the past. Russia has not so far offered to take part in salvage operations to save these monuments, although eight other nations, including the United States, have responded to a UNESCO plea on behalf of the United Arab Republic and promised aid.

The level of the reservoir of the present low Aswan Dam is 397 feet. The backed-up Nile already floods numerous monuments, among them the beautiful temples on the island of Philae that have been called the vision of paradise.

The Temple of Nectanebo

The oldest building on the island of Philae is the temple of Nectanebo (359-341 B.C.), dedicated to Isis, goddess of fertility. The pharaohs of ancient Egypt were believed to be incarnations of the gods themselves and often had to impersonate the gods at religious rites. Quite possibly, Cleopatra once officiated here in her capacity as the goddess Isis.

Ptolemy XIII, Cleopatra's father, built part of another temple on the island of Biġeh, a sister island to Philae. Another part of this temple was decorated during the reign of the Emperor Augustus. This temple replaced earlier ones that may go back as far as the 19th century B.C. The ram god Khnum and his companion goddess were worshipped here.

Religious carvings in bas-relief and hieroglyphic inscriptions decorate the temples on these islands.

Located between the present dam and the site of the new one, these monuments are flooded nine months of the year. When the new dam is completed the water level will drop but will vary daily and thereby damage the monuments even more.

The rock-cut temples at Abu Simbel are located south of—and upstream from—both the present dam and the new.

These two temples are probably the most magnificent of the hundreds of monuments now in danger. Built in the 13th century B.C., the great temple is 108 feet high, 124 feet wide, 210 feet deep and entirely carved out of the mountains on the river bank. Four 67-foot colossi in front of the temple depict Rameses II, who built the temple in honor of the gods Horus, Amon and Ptah, as well as of himself. Details of two of these figures are shown on the front cover of this week's SCIENCE NEWS LETTER.

Rameses was "the last great warrior king" and a fanatic builder. Close to the great temple stands a "smaller" temple dedicated to his wife, Nefertari, and to Hathor, goddess of love, mirth and social joy. Here again are four colossal statues of Rameses and two of Nefertari.

Many of the monuments in Egyptian and Sudanese Nubia can be moved, but the two temples of Abu Simbel cannot because they are carved out of a rock that is too delicate.

The new high dam, being built upstream from the present dam, will create a 300-mile lake, 426 feet deep. The lake will flood 21 temples and a number of archaeological sites, some still unknown.

Dr. John A. Wilson, professor of Egyptology of the University of Chicago, and executive secretary of the U. S. Committee for the Preservation of Nubian Monuments, told the U. S. Senate Foreign Relations Committee that rescue operations would cost from $60,000,000 to $90,000,000.

The committee was considering an amendment to the Mutual Security Act of 1954. This would have given the President the authority under certain conditions to use U. S. owned local currencies for the project up to about 30% of the cost, or about $20,000,000 to $25,000,000.

In the amendment as passed, no authorization of funds was actually made, but Congress asked the President to make recommendations to Congress regarding the project by March 1, 1961.

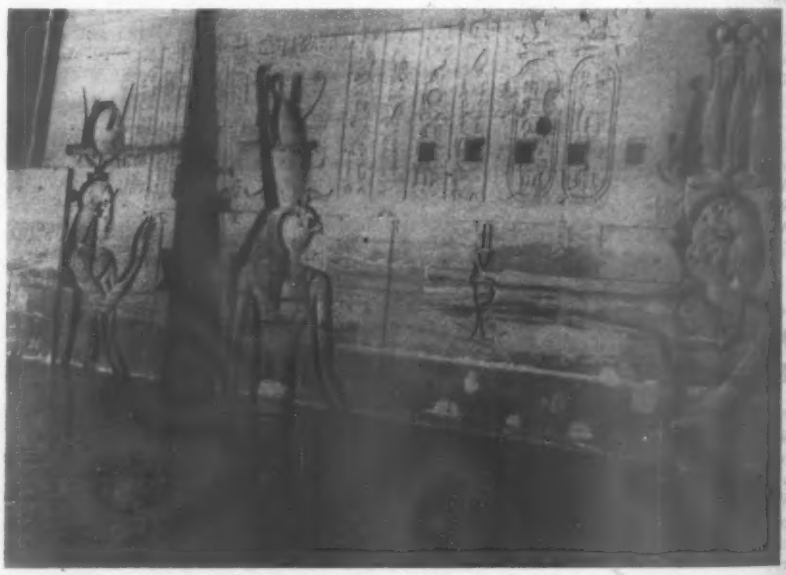
Dr. Wilson said that the most important temples must be left where they are and protected by dams. Three small dams have been proposed to protect the island of Philae, and UNESCO has asked a French technological firm, Andre Coyne and Jean Bellier, to work out a plan for a dam around the temples at Abu Simbel.

Cooperation Asked

UNESCO has asked for cooperation from the entire world in a campaign for the rescue of the ancient monuments in southern Egypt and Northern Sudan—collectively called Nubia.

Both Egypt and Sudan have offered to reward nations participating in the operations with at least half of the treasures they help save, with a few exceptions. They have also offered rights to excavate in other parts of the country for those who participate.

Among the countries that have already offered to help in this, the greatest archaeological adventure of the century, are some in open political conflict elsewhere.



FLOODED GODS—These gods on the temple of Isis on Philae are not wading in the Nile. Flooded nine months of the year, the temple will be in even greater danger when the new Aswan Dam is built. Here, at left, is the fertility goddess Isis, with her falcon-headed son Horus beside her. Hathor, goddess of love and mirth, is at right.

Austria is planning a mission of archaeologists. Belgium has offered 1,000,000 Belgian francs. Belgium also has offered to send three experts—an Egyptologist and two architects—and is now holding an exhibit of Egyptian art for the benefit of the campaign.

The French Society for Egyptology is collecting contributions for the campaign.

France will send architects, engineers, and specialists in the fields of ancient inscriptions, prehistory and anthropology. France is also considering offering the services of its National Geographic Institute in the field of photogrammetry.

India has promised the assistance of several experts. Poland has offered the assistance of a soil expert to join UNESCO's preliminary study mission.

Spain is ready to send specialists in prehistory and Coptic art. Spain would also make available a river boat equipped for scientific investigations. From the United Kingdom, the Egypt Exploration Society is already working at the Buhen site in Sudan near the Egyptian border.

A joint mission to excavate in Egyptian Nubia is being planned in the United States by the University of Pennsylvania Museum and the Peabody Museum of Yale University. Another American project is a five-year program by the Oriental Institute of the University of Chicago for investigation, excavations and documentation in Egyptian and Sudanese Nubia.

And one U. S. businessman has offered to buy the temple of Dendur and move it to Indiana.

• Science News Letter, 78:74 July 30, 1960

ROCKETS AND MISSILES

Atlas Will Be Simpler And Lighter in Design

THE ADVANCED "E" SERIES Atlas ICBM propulsion system will have a 389,000-pound thrust at sea level. The U. S. Air Force's Air Research and Development Command reported that it will be lighter and simpler in design than present Atlas missile engines. Designated MA-3, the new Atlas power plant is produced by the Rocketdyne Division, North American Aviation Corp., and has been tested at their facilities in the Santa Susanna Mountains.

• Science News Letter, 78:75 July 30, 1960

PHYSICS

Million-Dollar Reactor To Test Radiation

A NEW MILLION-DOLLAR NUCLEAR REACTOR to test the effects of radiation on military equipment will be installed next year in the Forest Glen, Md., section of Walter Reed Army Medical Center. It will produce intense, self-limiting pulses of nuclear radiation to which samples will be exposed repeatedly for short periods.

General Dynamics' General Atomic Division of San Diego, Calif., will design and construct both the pulsed TRIGA (Training Research Isotope (Production) General Atomic) reactor and associated test facilities.

• Science News Letter, 78:75 July 30, 1960

PUBLIC HEALTH

Test Civil Defense Shelter

IF AN ATOMIC BOMB should explode in the area of Long Island, N. Y., the laboratory building of the Brookhaven National Laboratory at Upton will provide an important civil defense shelter.

Preliminary tests indicate that in the Laboratory's basement, outside fallout contamination will be reduced 150 to 200 times by the brick and concrete, Dr. Robert A. Conard, civil defense liaison officer for the Brookhaven Medical Center, told SCIENCE SERVICE.

The basement will house emergency medical supplies and equipment, including several beds. Its area of more than 100,000 square feet can accommodate several hundred persons and necessary supplies.

The atomic and medical research center was exposed to a pattern of simulated fallout such as was used to test the Atomic Energy Commission Building in Germantown, Md. A radioactive slug of 200 curies of cobalt-60 was pumped through special plastic tubing on the surrounding grounds and the roof of the Laboratory building. Human exposure to this amount of cobalt-60 can be dangerous.

From 80% to 90% of the contamination that reached the basement from the simulated fallout came from the flat, gravel-covered roof.

Dr. Conard said studies show that this type of roof, common to modern buildings, yields the greatest concentration of radioactive contamination. A sloping-type roof, from which fallout can wash down, affords the greatest protection from radiation hazards. It would appear that consideration of radiation from fallout did not play a major role in the design of the hospital and medical buildings at Brookhaven.

The more than half-mile-long structure in which the atom-smashing alternate gradient synchrotron is housed underground also would provide shelter protection from a bomb explosion, Dr. Conard said. At the present time, however, civil defense plans do not include housing and equipment provisions for this extensive area.

• Science News Letter, 78:75 July 30, 1960

TECHNOLOGY

Can Cut Highway Toll

A SCIENTIFIC ATTACK on the automobile accident problem would reduce deaths and serious injuries by one-half in ten years.

Dr. Irwin D. J. Bross, chief of the department of statistics, Roswell Park Memorial Institute, Buffalo, N. Y., said this was a realistic target.

Emphasizing the need for cooperation of automobile manufacturers, legislators, law enforcement agencies, safety groups, scientists and the general public, Dr. Bross said, "If the public realized how close we are to a major reduction in the highway toll, the cooperation would be forthcoming."

The first step in attacking the problem is the collection of detailed scientific reports on accident circumstances and resulting injuries of persons involved in highway accidents, Dr. Bross said. He cited the Cornell Automotive Crash Injury Research Program (ACIR) as one that provided adequate information for a genuine scientific study of the accident-injury problem.

After establishing the chain of events leading up to an accident, Dr. Bross advised preventive measures. These include car design changes, commonly called "hardware."

Better door locks are still needed because the "modified door locks" that were successful in laboratories have been only about 25% better in holding doors shut in roll-over accidents.

Dr. Bross said one reason for this only slight improvement was that the hard-top styling trend, which came in about the same time as the modified door locks, weakened the top support and permitted greater deformation of the frame in the case of roll-over accidents.

Getting rid of pointed objects, projections, sharp bends in instrument panels and other hazards in the car interior would constitute what Dr. Bross calls a "delethalization" program.

Dr. Bross reported in Public Health Reports, 75:573, 1960, that highway design and traffic control devices also provide promising preventive measures.

• Science News Letter, 78:75 July 30, 1960

TECHNOLOGY

"Atomic" Incinerator Safely Disposes of Waste

SAFER AND MORE ECONOMICAL waste disposal is being accomplished by an "atomic incinerator" installed by the General Electric Company in its nuclear equipment plant.

Before its installation this spring, burnable contaminated material at the San Jose, Calif., plant was encased in concrete and dumped in special burial grounds. With the incinerator, in one hour 100 pounds of waste material can be reduced to a small pile of ashes which may be disposed of easily, thus cutting disposal costs by 75%, according to company spokesmen.

Designed by GE's Atomic Power Equipment Department, the incinerator has an automatic safety shut-off and is equipped with a filtering system which prevents the escape of radioactive particles from the high-temperature furnace box.

• Science News Letter, 78:75 July 30, 1960

• Books of the Week •

For the editorial information of our readers, books received for review are listed. For convenient purchase of any U. S. book in print priced at 95¢ or over, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

ADVANCES IN COMPUTERS, Vol. I—Franz L. Alt with A. D. Booth and R. E. Meagher, Eds.—*Academic*, 316 p., $10. Articles on general-purpose programming for business, numerical weather prediction, automatic translation, machine recognition of spoken words and binary arithmetic.

ALEXANDER VON HUMBOLDT: Scientist, Explorer, Adventurer—M. Z. Thomas, transl. from German by Elizabeth Brommer—*Pantheon Bks.*, 192 p., illus. by Ulrik Schramm, $3.50. Biography for young people.

AMERICAN INDUSTRY IN EUROPE—Hugo Uyterhoeven with Richard F. Messing and Duane M. Feeley—*Arthur D. Little*, 99 p., color graphs, $3. Report on the Arden House Conference on the European Common Market and the American chemical industry.

THE ARITHMETIC HANDBOOK — Martin H. Ivener—*Martin Pub. Co.*, 60 p., paper, $1. Written for junior high school level, definition of commonly used terms, charts and reference tables.

AUTOMATIC TRANSLATION — D. Yu. Panov, transl. from Russian by R. Kisch, A. J. Mitchell, Ed.—*Pergamon*, 73 p., $3.50. Gives account of early experiments made in translating scientific material from English into Russian, using the BESM electronic computer of the USSR Academy of Sciences.

BIRTH CONTROL AND PUBLIC POLICY—Norman St. John-Stevas—*Center for the Study of Democratic Institutions*, 83 p., paper, single copies free upon request direct from publisher, Box 4068, Santa Barbara, Calif. Annotated study of the history, English and U. S. laws, church attitudes and extent of acceptance of birth control.

ENGINEERING MATHEMATICS—J. Blakey and M. Hutton—*Philosophical Lib.*, 603 p., $10. The more theoretical chapters of Dr. Blakey's earlier UNIVERSITY MATHEMATICS have been replaced by chapters on numerical solutions of equations, statistics, relaxation methods and Laplace transformations.

A GUIDE TO EVERGLADES NATIONAL PARK AND THE NEARBY FLORIDA KEYS—Herbert S. Zim—*Golden Press*, 80 p., illus. by Russ Smiley, paper, $1. Guide to animals, plants and history of the area.

HANDBOOK OF SOCIAL GERONTOLOGY: Social Aspects of Aging—Clark Tibbitts, Ed.—*Univ. of Chicago Press*, 770 p., $10. Authoritative study dealing with the effects of aging on the individual as a member of society, and with the impact the presence of aging people has on the values, institutions and organization of society.

AN INTERDISCIPLINARY APPROACH TO ACCIDENT PATTERNS IN CHILDREN—Irwin M. Marcus and others—*Child Development Publications*, 79 p., paper, $2.50. Discussion of a four-year pilot study and its results, with summary of psychological, physical and intrafamily factors related to accident repetition.

AN INTRODUCTION TO STOCHASTIC PROCESSES, with Special Reference to Methods and Applications — M. S. Bartlett — *Cambridge Univ. Press*, 312 p., paper, $2.95. Reprint of 1955 edition.

THE LIVING HOUSE—George Ordish—*Lippincott*, 265 p., illus. by Graham Oakley, $4.50. Most original account of the interrelation of living creatures—eighteen generations of humans and up to 4,000 generations of woodborers, bats, mice, birds, beetles and bugs—in a Kentish farmhouse built in 1555.

MARINE BIOLOGY: Twentieth Annual Biology Colloquium, 1959—Ivan Pratt and James E. McCauley, Eds.—*Ore. State College*, 96 p., illus., paper, $2.50. On trends in marine biology, plant-animal relationship in the marine environment, biochemical changes in fish during maturation and physiological and ecological problems in brackish waters.

THE MOBILE MANUAL FOR RADIO AMATEURS—*American Radio Relay League*, 2nd ed., 282 p., illus., paper, $2.50. Selected articles on mobile receivers, transmitters, antennas and power supplies. Section on emergency and portable rigs.

MODERN UNIVERSITY PHYSICS—James A. Richards Jr. and others—*Addison-Wesley*, 993 p., illus., $10.75. First course in physics for students of science and engineering, stresses the developments of the 20th century, including the theory of relativity and the quantum theory.

NATURAL SELECTION IN HUMAN POPULATIONS—D. F. Roberts and G. A. Harrison, Eds.—*Pergamon*, 76 p., $3. Contains papers on mathematical models for selection, on the relative fitness of human mutant genes and on selection of gene systems in natural populations.

THE NEW INTERNATIONAL YEAR BOOK: A Compendium of the World's Progress for the Year 1959—Drenka Willen, Ed. Dir.—*Funk*, 560 p., photographs, $10. Encyclopedic survey of major events and developments in 1959, including the sciences; physics section prepared by Science Service. Also lists leading national and international organizations. Fully indexed.

THE PHYSICAL UNIVERSE—Konrad Krauskopf and Arthur Beiser—*McGraw*, 536 p., illus., $8.95. Attempts to present in simple form the essential elements of physical science, with emphasis on the frontiers of knowledge, such as elementary particles, cosmic rays, DNA and RNA, and the origin of the universe. Intended as text for two-semester course and for the general reader.

PHYSICS OF THE UPPER ATMOSPHERE—J. A. Ratcliffe, Ed.—*Academic*, 586 p., illus., $14.50. Leaders in their field treat the composition of the atmosphere and its extensions into outer space, the effect upon it of the sun's radiations, and the light which it emits when it is undisturbed and when disturbed during auroral display.

POLICIES FOR SCIENCE EDUCATION—Frederick L. Fitzpatrick, Ed.—*Teachers College*, 219 p., $3.95. Report concerned with the need to develop continuous science programs in the schools of all communities. It considers factors relating to the teaching of science on elementary and secondary school level.

RADIATION TECHNOLOGY in Food, Agriculture and Biology—Norman W. Desrosier and Henry Rosenstock—*AVI Pub. Co.*, 401 p., illus., $12.50. Introduction to radiation and its effects, radiation source technology, interaction of radiation with living organisms and practical details of radiation processing technology.

RETICULOENDOTHELIAL STRUCTURE AND FUNCTION—John H. Heller, Ed.—*Ronald*, 473 p., illus., $12. Papers presented at Third International Symposium, 1958. Covers such broad areas of RES as morphological aspects, antibody synthesis, host defense mechanism, radiation and isotopic studies, tumors, and cholesterol and lipid metabolism.

THE RHYTHM WAY TO FAMILY HAPPINESS—John P. Murphy and John D. Laux—*Hawthorn Bks*, 3rd rev. ed., 200 p., illus., $3.50. Intended as a practical guide with timetables for family limitation based on "rhythm theory" of birth control.

SIMMONS-BOARDMAN WORLD ATLAS — John Bartholomew — *Simmons-Boardman*, 112 p., maps, $2.75. Contains 80 pages of maps in color and glossary of geographical terms with an index listing more than 7,500 places. For home and office use.

SMALL PERTURBATION THEORY—W. R. Sears—*Princeton Univ. Press*, 63 p., paper, $1.45. Paperback reproduction from Princeton Series of HIGH SPEED AERODYNAMICS AND JET PROPULSION, published in 1954.

SODIUM CHLORIDE: The Production and Properties of Salt and Brine—Dale W. Kaufmann, Ed.—*Reinhold*, 743 p., illus., $20. Nineteen specialists here bring together all modern data on the sources, production, properties and uses of salt and brines.

SOVIET ECONOMIC POWER: Its Organization, Growth and Challenge—Robert W. Campbell—*Houghton*, 209 p., $4.75. After short historical background of the present Soviet economy, the author examines its productivity and efficiency, the sources of Soviet technical progress in the educational system and the place given to science.

STATISTICAL YEARBOOK 1959—United Nations—*International Documents Service, Columbia Univ. Press*, 618 p., $10; paper, $8. Eleventh issue of comprehensive collection of economic, demographic and social statistics on more than 250 countries and territories.

THE STRUCTURE AND FUNCTION OF MUSCLE—Vol I: Structure—G. H. Bourne, Ed.—*Academic*, 472 p., illus., $14. Comprehensive account of important aspects of modern international research on muscle structure.

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TOBACCO AND AMERICANS—Robert K. Heimann—*McGraw*, 276 p., 300 illus., $7.50. Historical picture book relating the story of the growth of the tobacco custom, tobacco manufacture and trade from the days of Columbus to 1958, when sales of tobacco products approximated $6.5 billion.

TRANSFORMERS AND GENERATORS FOR POWER SYSTEMS: Their Behavior, Capabilities and Rating—R. Langlois-Berthelot, trans. and rev. by H. M. Clarke, foreword by Charles F. Wagner—*Philosophical Lib.*, 541 p., $12. For the engineering student who has general knowledge of physics, for the engineer concerned with design and manufacture and for the operating engineer.

UNITED STATES GOVERNMENT ORGANIZATION MANUAL 1960-61—*Office of the Federal Register (GPO)*, 817 p., paper, $1.50. Revised as of June 1, 1960, manual is divided into legislative, judicial and executive sections, and outlines legislative authority, purpose and functions of each government agency.

WATER AND AGRICULTURE: Symposium, December 1958—Roy D. Hockensmith, Ed.— *Am. Assn. for the Advancement of Science*, 198 p., illus., $5. Papers by recognized authorities on programs and prospects of water management for the future; water sources, water planning and uses; and evaporation control.

WEATHER FORECASTING FOR AERONAUTICS—Joseph J. George and others—*Academic*, 673 p., maps, $15. Methods for practical application of the fundamentals of the science of meteorology, based on research and development performed in the Eastern Air Lines meteorological laboratory, and tested in day-to-day forecasting practice.

X-RAY POWDER PHOTOGRAPHY: In Inorganic Chemistry—R. W. M. D'Eye and E. Wait—*Academic*, 222 p., illus., $8.50. Written primarily for the research chemist with no experience of crystallography, giving the necessary background for understanding the powder method of observing X-ray diffraction in the laboratory.

• Science News Letter, 78:76 July 30, 1960

ANTHROPOLOGY

Ancient Rome Forbade Downtown Traffic in Day

ANCIENT ROME had its traffic problems, too, and used some of the same techniques being tried in our big cities today to solve their problems.

Rome's narrow streets were not marked "One Way" but in effect they were, because each driver sent a runner ahead to hold up traffic at the other end of the street or alley until the chariot had passed through.

The fringe parking plan used in modern large cities to relieve the downtown parking problem was used in Rome in the days of Julius Caesar. In the Roman day there were 12 hours of "daylight" adjusted according to the season. Private vehicles were forbidden on the city streets from dawn until two hours before dark. A traveler coming to Rome had to park his carriage at the city gates and continue into town either on foot or in a carrying chair or litter.

Traffic officers in ancient Rome belonged to a corps originally organized to guard against fires. They were officially known as Vigiles, but popularly called the "little bucket fellows." Most traffic restrictions and regulations were lifted at sundown, but the Vigiles handled the situation when two wagon drivers would get into a noisy dispute about the right of way. The police-firemen in Rome were freed slaves, Kenneth D. Matthews Jr., of the University of Pennsylvania's Museum, reports in Expedition, 2:22, 1960.

Women drivers were not a problem in ancient Rome. In the third century B. C. a law was passed forbidding women to ride in carriages. Twenty years later the ladies of Rome forced the repeal of this law but during the first century A.D. the restriction was again in force.

• Science News Letter, 78:77 July 30, 1960

TECHNOLOGY

Automated Equipment In Nuclear Industry

ONE OF THE FIRST applications of automated equipment in the atomic power equipment industry is being made by General Electric Co. New tape-controlled machines, installed at San Jose, Calif., will cut costs sharply and are expected to maintain high standards of quality control. Automated machinery has recently come into use by suppliers of components to the nuclear industry, but until now the industry itself had made only limited attempts to automate.

• Science News Letter, 78:77 July 30, 1960

PHYSIOLOGY

Stressful Space Chamber Tests Human Endurance

A STRESS CHAMBER nearing completion will simulate six hazards of space travel: noise, intense light, vibration, changes in barometric pressure and variations of temperature and the composition of various gases.

The test chamber, being set up by the Boeing Airplane Company in Seattle, Wash., will permit tests of human capability to withstand stresses in combination.

As a "pilot" sits performing tasks, such as identifying simulated targets on a radar screen, he may be subjected to the chamber's walls being heated to 400 degrees, air pressure changing with altitude, piped-in noise simulating blast-off and other stresses.

The chamber may be used for the Dyna Soar manned space glider program or to simulate conditions in moon stations and underground launch stations.

• Science News Letter, 78:77 July 30, 1960

ASTRONOMY

Dimmest White Dwarf Star Discovered

THE DIMMEST WHITE DWARF STAR yet discovered has been found by Dr. W. L. Luyten of the University of Minnesota.

White dwarf stars are super-dense objects having about the same amount of matter as the sun packed into the volume of a planet. They are very faint, blue-white stars with a natural brightness only about a thousandth that of the sun. White dwarfs are believed to be the final state of a star, when it has settled down to shine feebly.

Dr. Luyten reported to Harvard College Observatory that LP 321-98, as the star is called, is "probably the least luminous white dwarf now known." The star was among 20 of this class recently discovered by Dr. Luyten.

Also reported by Harvard College Observatory is discovery of a fast-moving object visible from the Southern Hemisphere.

• Science News Letter, 78:77 July 30, 1960

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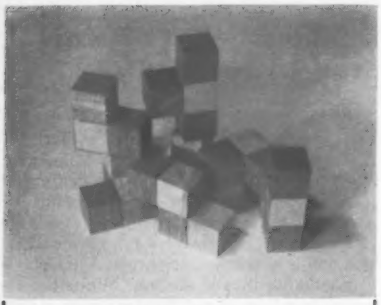

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ZOOLOGY

Lip-Smacking Grasshopper

A GRASSHOPPER with a talent for lip-smacking has turned out to be quite an unusual insect. *Paratylotropidia brunneri* Scudder is the first insect known to communicate over fairly long distances by producing an audible sound from the mouth—literally smacking its lips.

Dr. Richard D. Alexander of the University of Michigan's Museum of Zoology, Ann Arbor, while collecting insects in a prairie south of Valmeyer, Ill., had bagged several of these large grasshoppers before he realized that soft ticking sounds were coming from this species.

Dr. Alexander noticed that the mandibles, or mouth parts, were moving in time with the sound. When one hopper ran down, another would begin ticking a second later from just a few feet away.

The hoppers responded not only to each other but to Dr. Alexander as well. After ignoring various artificial noises, a nearby male answered the call of a metal thermometer case striking a brass belt buckle.

Produced at the rate of six or seven per second, usually in groups of four, the grasshopper ticks resemble a shorter, softer version of the ticking song of a katydid. The call can be heard several yards away.

Dr. Alexander reports in Science, 132:152, 1960, that other insects often produce long distance sounds by rubbing their hind legs together. Mouth sounds are produced by other insects, but not for the purpose of long-range communication.

It may be, the Michigan collector says, that the grasshopper's lip-smacking signal evolved through a stage in which feeding noises were significant. At present it may be effective as a long-range signal only in areas where there are few other sound-producing insects.

• Science News Letter, 78:78 July 30, 1960

GEOPHYSICS

Earth's Steam Released

VOLCANIC ERUPTIONS, such as the recent explosions of Mount Etna in Sicily, is one way the earth has of letting off steam from internal geophysical tensions and pressures.

The awesome destructive force of these natural blast furnaces far exceeds that of man-made atomic explosions. However, volcanic fallout, unlike atomic fallout, can be beneficial. If the lava that falls out or flows over the crater of an erupting volcano is accompanied by dust or ash, the benefits to the soil are extensive and readily available.

The farms and vineyards on the slopes of the 10,758-foot-high Etna, the giant of European volcanoes, are among the most fertile in all of Sicily. This is in no small measure due to its high volcanic activity which, although frequent, fortunately has stopped short of killing and destruction in the vast majority of its eruptions.

The current eruptions of Etna are its largest in this century, but so far give no evidence of being a prelude to the tragic consequences that followed the blast of Mt. Pelee, Martinique, in 1902. That eruption killed all but one of the 28,000 inhabitants in St. Pierre, a seaport several miles from the 4,000-foot volcano. Most deaths were from the steam and gases that poured forth from the mouth of the volcano in tremendous volume. Little lava accompanies this type of volcanic explosion.

Perhaps the most potentially dangerous volcanic eruption of this century was that of Mt. Katmai in Alaska in 1912. Dr. Robert F. Griggs, who led five expeditions to Katmai following the explosion, reported that had the eruption occurred near New York City, the entire city and its millions of inhabitants would have been destroyed and the gaseous sulfur fumes would have polluted the air of the territory east of the Rocky Mountains. No lives were lost from the Katmai eruption because it is so remote.

Paradoxically, the vast amount of heat released by volcanic eruptions does not have a warming effect on the atmosphere. The volcanic dust that accompanies most eruptions creates a vast invisible sunshade that cuts off a significant amount of radiation from the solar system.

Weather records note 1816 as the "Year Without a Summer," when cold weather prevailed all over the temperate zone. It followed the eruption of Tomboro in the East Indies, one of the greatest on record, occurring the previous year. Lowered temperatures throughout the earth followed the explosions of Mt. Pelee in 1902 and Mt. Katmai in 1912.

• Science News Letter, 78:78 July 30, 1960

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Faith in Science Urged

(Continued from p. 67)

Faith in science, Sir Cyril told his colleagues, is not incompatible with other kinds of faith. He said that there seems to be no inconsistency in believing that scientific knowledge is itself one of the great instruments of higher ends.

Sir Cyril predicted that in the future a great upheaval of ideas may well cause a complete re-orientation of science in relation to philosophy and to the conceptions of possible worlds.

He said the Royal Society's responsibility is to work as a smaller creative community within the larger. Its members have responsibility to mankind in general as well as to their native country and the Royal Society.

The most original minds, Sir Cyril said, are those who continue the work done by their predecessors and whose own work is fulfilled by their successors.

He said that this trait is true not only of genius but of all men. This continuity is the stuff of history and is what the Royal Society honors at its tercentenary celebration.

• Science News Letter, 78:67 July 30, 1960

Do You Know

Americans are expected to draw perhaps 12 billion *checks* for all purposes in 1960—double the volume of ten years ago.

Of the 573,000 tons of *natural rubber* imported by the United States in 1959, 185,000 tons came from Malaya and 158,000 tons from Indonesia.

A recent census showed 36 unprovoked attacks on swimmers by *sharks* in 1959, 13 of which resulted in death.

The Geological Survey plans to conduct an inventory of *water use* in the United States in 1960.

The Soviet Union is currently graduating 90,000 *engineers* annually, double the number of United States engineering graduates.

One birth in 87 produces *twins*, and, among twins, only one set in three is identical.

Questions

ANTHROPOLOGY—Who were the two most famous lawyers in the Scopes trial? p. 69.

ASTRONOMY—What is the diameter of the white dots found in a sunspot? p. 66.

GENERAL SCIENCE—What are three important results of space research? p. 70.

Photographs: Cover and p. 74, UNESCO/Laurenza; p. 66, National Science Foundation; p. 69, U. S. Naval Ordnance Laboratory, White Oak; p. 71, University of California, L.A.; p. 80, Pyro Plastics Corporation.

METALLURGY

Iron Rust Theory Given

A BASIC EXPLANATION for the rusting of iron, one of the most destructive and wasteful chemical reactions known, has been found by Dr. Earl A. Gulbransen and T. P. Copan at Westinghouse Research Laboratories, Pittsburgh, Pa.

Iron corrosion is believed to waste up to seven billion dollars annually in the United States alone. Eighty million dollars alone are spent by automobile owners replacing mufflers each year.

The new theory suggests that hydrogen ions are the culprit. The hydrogen ions come from water vapor, which must be present if iron rusts very much at room temperature. The tiny hydrogen particles are thought to penetrate the iron and enlarge the sites at which oxygen normally combines with the metal.

Previous explanation for iron corrosion was that it is an electrochemical reaction, somewhat like that occurring in an ordinary battery. The new theory suggests that something more fundamental takes place in the iron, although an electrochemical reaction may also be present.

In a series of experiments during which the conditions required for electrochemical reactions were eliminated, the Westinghouse scientists reduced the rusting of iron to the simplest possible process. Pure iron wires about as thick as a fine sewing thread were reacted with oxygen and then with water vapor at 835 degrees Fahrenheit under controlled conditions.

Results of the corrosion were then studied under an electron microscope capable of magnifying objects up to 300,000 times.

The scientists reported that with dry oxygen the iron forms a protective coating from which grow billions of tiny round oxide whiskers less than one-millionth of an inch in diameter and 30-millionths of an inch high. Each whisker grows from a single, specific growth site.

With water vapor, however, there is a "startling change" in the oxide surface, the scientists reported. From the growth sites erupt thin, pointed bits of iron oxide that spread across the metal surface. Shaped somewhat like blades of grass, they are about one-millionth of an inch thick, 30-millionths of an inch wide and 300-millionths of an inch high.

As they grow, they spread more than 50 times in area over the sites observed for dry oxygen alone, reaching a density of nearly one billion per square inch of surface area.

The amount of iron rust they represent is 250 times that which forms when the water vapor, and the hydrogen ions it releases, are absent from the reaction.

The experiments by the Westinghouse scientists show that less than one part of water vapor in 200 parts of the dry oxygen atmosphere will cause the blade-shaped crystals to form. At room temperature this would correspond to a relative humidity of about three percent.

• Science News Letter, 78:79 July 30, 1960

MEDICINE

Hypertension Research

HIGH BLOOD PRESSURE (hypertension) caused by poor kidney blood supply can be corrected by surgery linking the main aorta and the kidney with synthetic vessels.

Dr. John R. Derrick of the medical branch of the University of Texas made this report at a meeting of the International Congress of Medicine and Surgery at the University of Puebla, 50 miles from Mexico City.

A minority of persons have a kidney that depends upon two or three small arteries rather than one big artery for its major blood supply, Dr. Derrick pointed out. He explained that research at the medical branch revealed that a blood-starved kidney of this kind gets local help when it calls for more blood, but usually this is at the cost of increasing blood pressure throughout the entire body. It also is a contributing cause of heart damage.

Dr. Derrick reported on a three-year study based on autopsy examinations of 520 hospital patients, many of whom had high blood pressure. The investigators found that 69% of the adults with small, dual kidney arteries had suffered from hypertension. Only 17.7%, a six-to-one ratio, of those with one large normal artery per kidney had this trouble.

Surgeons at the medical branch and elsewhere have been successful in a high percentage of cases in reducing blood pressure permanently by linking the main aorta and the kidney with synthetic vessels.

When a kidney needs more blood, the organ produces a chemical substance called renin. This is combined in the system with a substance in the liver known as angiotensinogen. This combination produces angiotensin, which then flows throughout the entire blood system of the body, causing a constriction of blood vessels resulting in elevation of the patient's blood pressure.

Dr. Derrick said further study in flow dynamics (motion and force) of blood is needed to bear out the initial findings of the medical research team.

To determine what kind of arteries supply a patient's kidney with blood, doctors are using new techniques for injecting dyes into the blood system of the suspect area, after which they obtain accurate X-ray photos.

The American Heart Association supported the research work of the Texas investigators.

• Science News Letter, 78:79 July 30, 1960

New Machines and Gadgets

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 1050. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

LIQUID HAULER helps eliminate the problem of dead-head runs for trucks—returning empty on trips back to home base. Within 15 minutes after a dry-freight truck is empty, two men can inflate a pillow type rubber-coated container, and the truck can make a return trip with a liquid cargo. Special emphasis is placed on liquid edibles, such as milk, vegetable oils and fruit juices.

• Science News Letter, 78:80 July 30, 1960

HEAT DEFLECTOR designed for floor and wall heat registers provides better, cleaner heat distribution by deflecting heat toward the center of the room. The sooty furnace heat goes to the center and walls, draperies, ceilings and furnishings stay cleaner longer.

• Science News Letter, 78:80 July 30, 1960

SANITARY TOOTHBRUSH CABINET holds five toothbrushes inside a plastic container safe from dust-borne germs. The individual plastic doors work automatically. When a brush is pulled out, the door opens, and when the brush is put back the door closes behind it.

• Science News Letter, 78:80 July 30, 1960

THE EIFFEL TOWER, symbol of Paris and of France, is now available in a do-it-yourself kit. Produced under French supervision, the model, shown in the photograph, is complete in every detail, is

metallic colored and stands nearly three feet high when completed.

• Science News Letter, 78:80 July 30, 1960

MOTH-PROOF PAPER protects clothing and other woolen materials against moth damage. A highly effective paper for control of roaches, ants and other insects, it is used to line closet shelves. The paper, carrying a printed design, is impregnated with an odorless insecticide harmless to humans and domestic animals.

• Science News Letter, 78:80 July 30, 1960

DOOR-PROTECTING DISKS prevent damage to thin, veneered doors from conventional door bumpers. If applied to the door with the self-contained adhesive, the disk protects the door from puncture by any protruding object. It also can be used on a plaster wall or on wall board to prevent damage to the wall from a door knob.

• Science News Letter, 78:80 July 30, 1960

ROLL-A-PLANT moves plants weighing up to 150 pounds easily on ball-bearing wheels without damage to floors and carpetings. Eight inches in diameter, it will support floor plants of all shapes and sizes. The rolling holder is made of brass-coated wrought iron and will not tarnish or rust.

• Science News Letter, 78:80 July 30, 1960

HOME PLANETARIUM accurately projects more than 60 constellations on the walls and ceiling of any darkened room, with proper compensation for both time and space. The stars are projected as pinpoints of light through holes in a star sphere that is vacuum-formed, and made of light plastic.

• Science News Letter, 78:80 July 30, 1960

Nature Ramblings

By HORACE LOFTIN

ALTHOUGH FLYCASTERS and other fishing lure purists may disdain the method, one of the surest ways to catch your limit of largemouth bass or other game fish is to use live bait. And to satisfy the demands of fishermen, millions of minnows are raised commercially in carefully regulated ponds throughout the nation.

Getting the best yield of minnows per acre of pond is serious business to bait producers, and they have learned to use some tricks that nature has been employing for millions of years. For example, two sizes of minnows are in demand: small ones for normal use, and super-sized minnows for the granddaddy bass.

Now the small and large minnows are all the same species and even the same age as a rule. How do the baitmen control the size of their minnows?

Following a clue from nature, they simply increase the number of fry per pond when

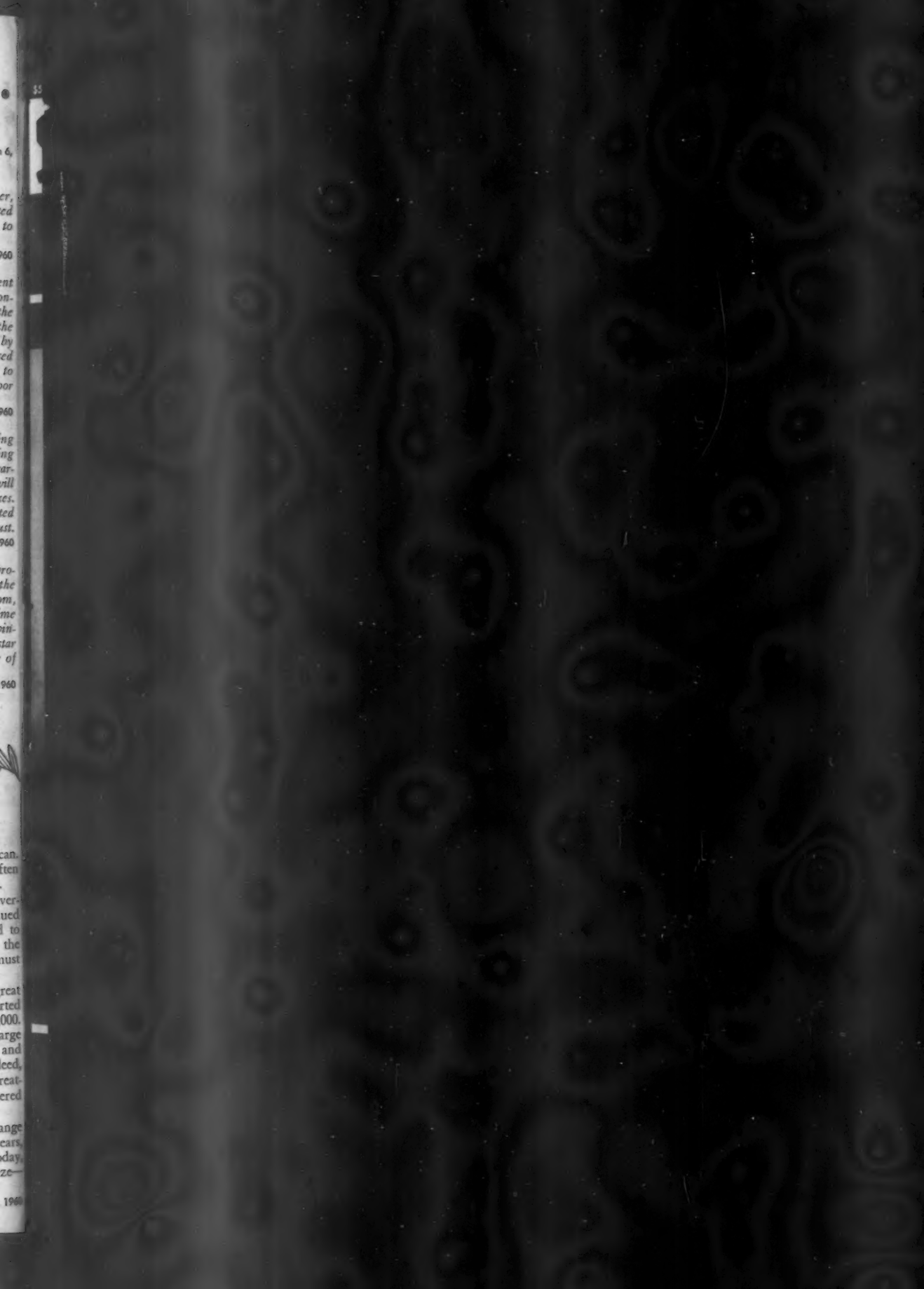
Nature and Numbers

they want small minnows and decrease the number for large minnows. When, for example, 100,000 young fish are placed in a pond, the food supply is short and the fish are stunted. But when only 1,000 are placed in the pond, and fed the same total amount of food, the young become "super-sized."

Though this simple procedure seems obvious enough, it is a lesson in wildlife conservation that we have been slow to recognize. For too many well-meaning persons, conservation means keeping alive every single animal or plant that we can. The hunter or scientific collector is often viewed as the worst enemy of wildlife.

But if a given range or stream is overpopulated with deer or fish, continued preservation of a surplus can only lead to the ruin of the animals. To obtain the largest, healthiest population, you must limit its numbers.

Some years ago, on one of our great Federal preserves, a movement was started to "protect" a deer herd of about 4,000. Hunting was strictly prohibited, and large predators such as wolves, coyotes and pumas were ruthlessly destroyed. Indeed, the deer herd did increase with this treatment. In about 15 years, the herd numbered 100,000.

But with this many animals, the range was stripped of food. Within two years, some 50,000 deer died of starvation. Today, this herd is back to about its original size—the size the range can support.

• Science News Letter, 78:80 July 30, 1960